4. CONCLUSION

The objective of this experiment was to measure and evaluate the susceptibility of a C-band satellite DTV receiver to gated-noise interference. Results in this report have been measured with a reliable test system and repeatable procedures. Validation against theory is demonstrated in Appendix B. Results are expected to be fundamental in understanding interference caused by DS-UWB and MB-OFDM signals. In these concluding remarks, findings are summarized and their significance explained.

Temporal analyses showed that band-limiting the GN interference signals elongated on-times and shortened off-times, which had profound effects on corresponding *APD*s. When τ_{off} was less than or comparable to the receiver reciprocal bandwidth, the elongated on-times overlapped, producing Rayleigh amplitude statistics. When τ_{off} was several times greater than the reciprocal bandwidth, the elongated on-times remained distinct, producing gated-noise amplitude statistics.

These temporal and amplitude observations help explain the susceptibility results. When τ_{off} was less than or comparable to the reciprocal bandwidth, DTV susceptibility results were strictly dependent on average power of the band-limited interference. This is because Rayleigh-distributed amplitudes correspond to zero-mean Gaussian noise, which is completely characterized by its variance or average power. Moreover, the DTV receiver was least susceptible to signals that resembled continuous noise after band-limiting. Conversely, when τ_{off} was several times greater than the reciprocal bandwidth, gating was resolved and susceptibility results were clearly dependent on the gating parameters τ_{on} and ζ. The DTV receiver was more susceptible to the gated-noise signals that maintained some semblance of a gated signal after band-limiting. More specifically, DTV susceptibility increased with increasing τ_{on} and decreasing ζ.

Interestingly, peak-to-average ratios of the band-limited GN signals were also dependent on τ_{on} and ζ. In fact, as demonstrated in Figures 28 – 30, there was some correlation between measured DTV susceptibility and *P/A*, i.e., DTV was more susceptible to GN interference with higher *P/A*. However, these figures also show distinct separation between τ_{on} curves, which indicates that *P/A* alone cannot serve as a sole predictor of DTV interference susceptibility.

In summary, DTV susceptibility to gated-noise interference cannot be predicted by interference power characteristics alone. Indeed, it is essential to consider the temporal parameters of the interfering signal as well as the bandwidth of the victim receiver. Additionally, FEC performance trends, characterized by BER_{TOV}, behaved similar to DTV susceptibility trends, leading to the conclusion that DTV susceptibility is determined largely by FEC performance.

Caution is advised when extending these results to small ζ. For example, it is entirely likely that low susceptibility could be achieved for each τ_{on} provided ζ is sufficiently small, which may create conditions more favorable to FEC performance or simply provide longer off-times where errors are unlikely. Determination of these conditions is beyond the scope of this report.

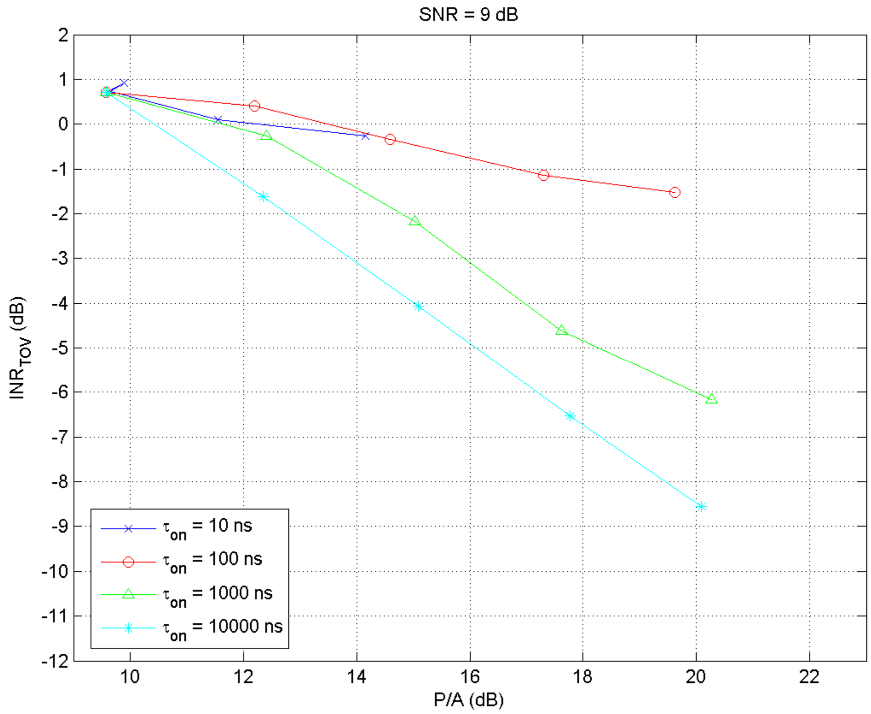

Figure 28. INR_{TOV} versus P/A for a DTV receiver operating at SNR = 9 dB and exposed to GN interference.

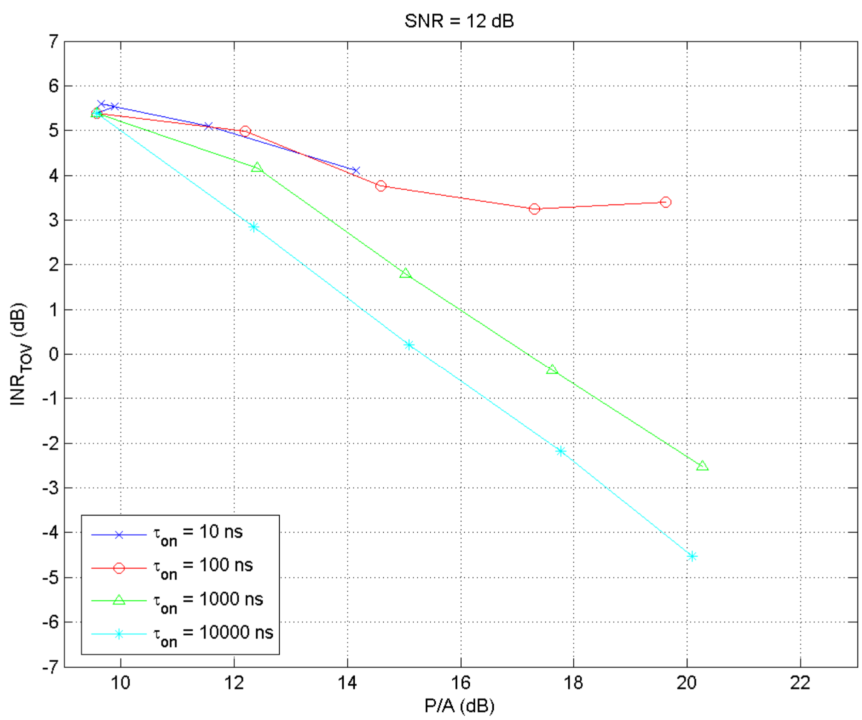

Figure 29. INR_{TOV} versus P/A for a DTV receiver operating at SNR = 12 dB and exposed to GN interference.

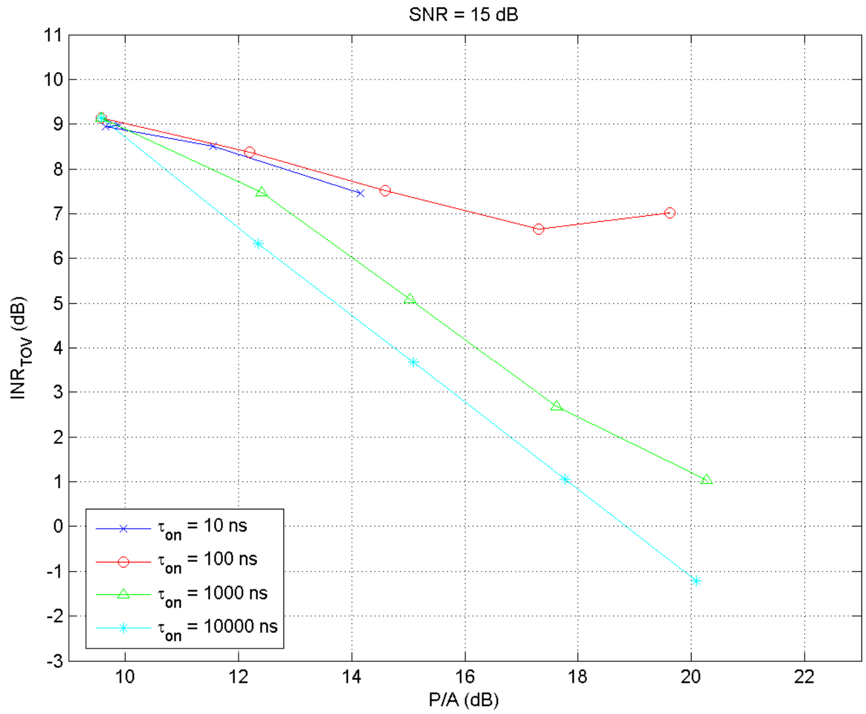

Figure 30. INR_{TOV} versus P/A for a DTV receiver operating at SNR = 15 dB and exposed to GN interference.